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MITOURA MILLERORUM (CLENCH) AND ITS OCCURRENCE IN THE UNITED STATES (LYCAENIDAE)

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ABSTRACT. The male imago is illustrated and the male genitalia described and illustrated for the first time. A new Mexican and a thus-far unique southwestern United States collection record are documented along with clarifications concerning the original description of *millerorum*, specimens which represent it, and its inter-specific diagnosis. A larval specimen collected on *Arceuthobium globosum* Hawksworth and Wiens (Loranthaceae) is discussed relative to its possibly representing *millerorum* and, if so, the importance of any apparent monophagy in defining the species.

Mitoura millerorum (Clench) was described from a holotype female collected in the vicinity of El Encarnacion, Hidalgo State, Mexico, with a male paratype (not personally examined by Clench) designated from Palos Colorados, Durango State, Mexico (Clench, 1981). The purposes of this brief paper are to: (1) illustrate the male imago and describe and illustrate the male genitalia of the hitherto undescribed male of *millerorum*; (2) document further collection records of the species, including one in the United States; (3) clarify the comments of Clench (loc. cit.) concerning the species and specimens representing it; (4) summarize the present knowledge of its biology and (5) thereby encourage lepidopterists in the United States to pursue larger samples of this apparently rare hairstreak butterfly.

Circumstances Surrounding the Description of *M. millerorum*

The description of *M. millerorum* was published posthumously. Its description and associated type designations were complicated, therefore, by the assembling of Clench's unfinished manuscripts and the apparently related type series. This effort, made by Drs. Lee D. and Jacqueline Y. Miller was hampered in regard to *millerorum* by several circumstances. Firstly, Clench had not seen and had, therefore, not dissected the male paratype specimen from the American Museum of Natural History. Its existence had been called to his attention earlier by me. A description of the species had been prepared in manuscript by me, using the aforementioned specimen and a female in the British Museum (Natural History) collected in July at Bolanos, Jalisco State, Mexico. In 1979, I deferred description of the species to Clench, sending him information concerning both of the above specimens (the latter of which had also been listed by Shields, 1965, as *M. spinetorum* (Hewitson)). In turn, Clench forwarded for my examination the unique specimen from Otero County, New Mexico, noted by him (loc. cit.,

pp. 22–23) as collected "3 mi. N. Weed, ca. 6700 ft., 12 June 1977," by H. K. and M. Clench. This specimen had the undersurface hindwing postbasal stripes characteristic of *millerorum* but was identified by Clench (loc. cit.) as an aberration of *spinetorum*. By the time of his death, Clench had not dissected the eventual holotype of *millerorum*, though I had returned my dissection of the Otero County specimen to him for comparison.

When the Millers assembled the material for Clench (loc. cit.) none of the above material or information was located. Hence, when the original description was published, the Otero County specimen had still not been found, and although I possessed a drawing of its genitalia, I had not been able to compare it to either the eventual type or the Bolanos, Mexico, specimen. As a result there was no standard of comparison to identify the Otero County specimen properly. Further, the male of *millerorum* remained undescribed; the treatment of *millerorum* was ultimately limited to comments in the remaining unfinished manuscript of Clench, and information concerning *millerorum* cullable from Shields (loc. cit.) was not integrated into the original description. In subsequent years all of the above problems have been clarified.

Clarifications Concerning *M. millerorum*, Its Biology and Occurrence

Fig. 1 illustrates the features of the male and female genitalia of all known *Arceuthobium* (Loranthaceae)-feeding *Mitoura* taxa.[1] Shorter, hairlike spines on the cephalo-ventrad surface of the valvae ("bilobed configuration" *sensu* Johnson, 1976, 1978, and in press[2] are emphasized, while long hairlike spines not figured. The former, along with overall opaqueness in this valval region, characterize *Arceuthobium*-feeders contrasted to Cupressaceae-feeders (see Johnson, 1976, and in press) along with numerous other characters. Among *Arceuthobium*-feeders, the male genitalia of *M. millerorum* are distinctive as follows: (1) bilobed area markedly larger as contrasted to caudal length of valvae; (2) saccus widely parabolic; (3) cephalad cornutus at aedeagal terminus bifurcate; and (4) (not illustrated) caudal one-third of aedeagus distinctly curved (60° angle) in known specimen. This latter trait occurs in no other known *Mitoura* though its generality in *millerorum* cannot be certain from the single known specimen. Differences in the female genital plate of *Arceuthobium*-feeders are most apparent in the nature

[1] The life histories of *M. spinetorum* and *johnsoni* (Skinner) have been well documented (see Shields, loc. cit.). That of *millerorum* is known only from the circumstantial data presented in this paper or inferred from the overall unity of morphological characters shared by taxa of Fig. 1 as compared to *Mitoura* taxa known to feed on Cupressaceae (see Johnson, 1976, 1978, and in press) [in press]. Revision of the Callophryina of the world with phylogenetic and biogeographic analyses (Lepidoptera: Lycaenidae). Ms. (in part) as Ph.D. dissertation, Graduate Center, City University of New York (1981). 902 pp.

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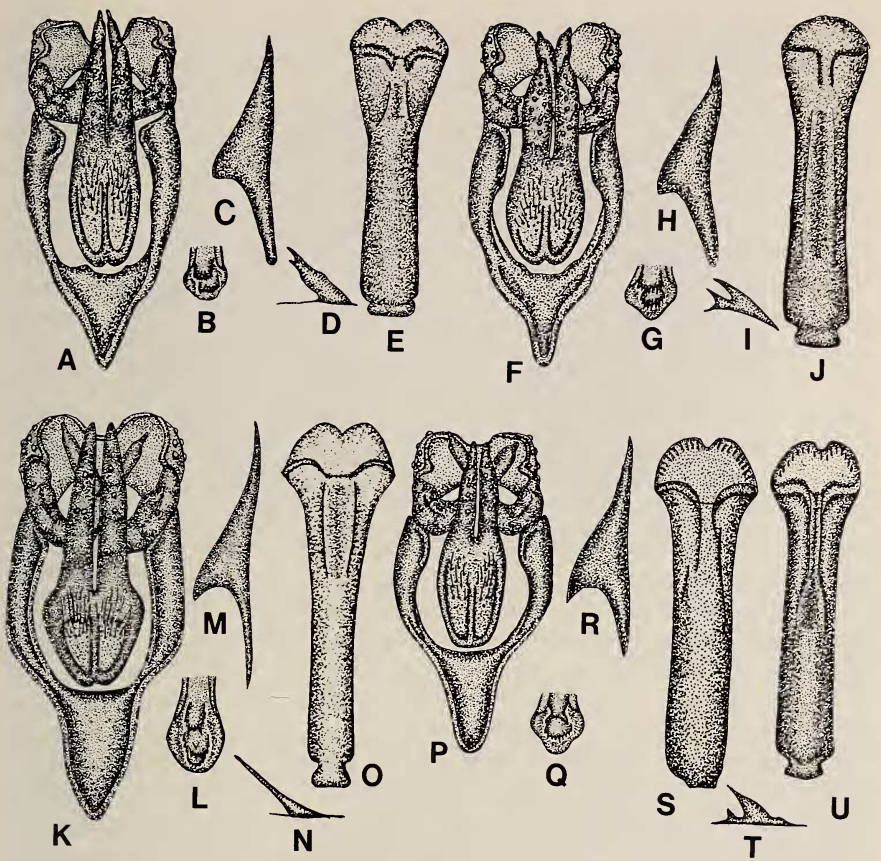

FIG. 1. Male and female genitalia of *Arceuthobium*-feeding *Mitoura* taxa—**A, B, C:** topotypical *M. johnsoni* male, ventral view of genitalia, caudal tip of aedeagus, and lateral view of valvae, respectively; **D, E:** topotypical *M. johnsoni* female, signum and genital plate, respectively. Using same display format—**F, G, H** (male); **I, J** (female): topotypical *M. spinetorum*; **K, L, M** (male): holotype *M. estela*; **N, O** (female): paratype *M. estela*; **P, Q, R** (male): paratype *M. millerorum*. Entry **S** (female): holotype *M. millerorum*; **T, U** (female): *M. millerorum*, Otero County, New Mexico. So as not to obscure other features, the male genitalia are drawn without the long, hairlike spines which protrude from the caudad portion of the valvae and ventrad surface of the uncus.

of the lamellal lips caudad on the ductus bursae, the nature of the sclerotizations surrounding these lips, and the shape of the sculpturing caudo-ventrad on the ductus bursae. Readers familiar with genitalia of Cupressaceae-feeding *Mitoura* will note the overall differences apparent in these as compared to taxa in Fig. 1 (see Johnson, 1976, in press). Johnson (in press) attributes this hiatus to the relatively more primitive (plesiotypic) nature of the characters in genitalia of *Arceuthobium*-feeders. Variation possible in the rather simplified struc-

FIG. 2. Undersurfaces of the wings of (**A, left**) *M. millerorum,* paratype male and (**B, right**) *M. spinetorum* (Fort Wingate, New Mexico, AMNH) chosen for its resemblance to *millerorum,* having nearly all apparent wing characters except the postbasal stripes (see text for discussion).

tural components of these is less than that in more highly specialized genitalic structures characteristic of Cupressaceae-feeders. As a result, relative significance of interspecific differences among taxa in Fig. 1 must be viewed with reference to *Mitoura* taxa as a whole (particularly these seen as a primitive to derived hierarchy) rather than in terms of the few apparent differences within the *Arceuthobium*-feeders alone. With such a view, *M. millerorum* is clearly a sister species of *spinetorum* and not to be viewed as a subspecies.

Only one of the illustrated species, *M. estela* (Clench), is not known to occur in the United States. In Fig. 1, item S illustrates the holotype of *millerorum* while T and U illustrate the Otero County, New Mexico, specimen. It is apparent from these comparisons (see figure explanation for details), along with the distinct wing characters mentioned by Clench and confirmed by my examination, that the latter represents *millerorum.* The specimen has subsequently been located by Dr. John Rawlins at the Carnegie Museum of Natural History and recurated in that collection. Genitalic features of the Bolanos, Mexico, specimen are similar to both of the above mentioned specimens.

Figure 2 illustrates the wing undersurfaces of the paratype male of *millerorum* (left, A; genitalia, Fig. 1 P–R) and a specimen of *spine-*

torum (right, B) selected for its overall resemblance to *millerorum* except for the postbasal stripes. The latter selection is relevant to Clench's apparent reason for associating the Otero County specimen with *spinetorum*. Postbasal stripes in *millerorum* are usually more apparent than indicated by the photo and vary slightly from two distinct slashes, generally in the same plane, to a single, long, straight stripe. The square shape of the distad extensions of the median line near the *Thecla*-spot also seems characteristic of *millerorum* as opposed to the more w-shaped distad extensions of the median line in *spinetorum*. Clench reasoned that the Otero County specimen was more like *spinetorum* in all characters except the postbasal stripes. Undoubtedly this was because the limbal area of the hindwing undersurface on many *spinetorum* was like that on the Otero County specimen: brighter and more flushed with gray-blue and with only small and obsolescent black spots along the submargin. The opposite tendency, however, also occurs as noted in Fig. 2. As a result it is important to summarize that the best overall superficial character for recognizing *millerorum* is its postbasal stripes. Comparatively, *M. johnsoni* is brown on the upper surface of the wings (not steel blue as on the remaining taxa in Fig. 1), while on *estela* the limbal area of the hindwing undersurface is accented by bright orange-red across the entire submargin (making it unmistakable). The association of *M. dospassosi* (Clench) with the above taxa (Clench, loc. cit.) was incorrect. It is clear from the morphology of *dospassosi* that it is most likely a Cupressaceae-feeder (see Johnson, in press). Clench's assessment that the upper surface of *dospassosi* appeared blue (Clench, loc. cit., p. 32: his apparent reason for the clustering) is questionable. Most specimens of *dospassosi* appear black or no more blue-tinted than specimens of *M. sweadneri* Chermock, a taxon with which *dospassosi* shares numerous genitalic characters and which feeds on *Juniperus* (Cupressaceae) (Johnson, 1978, in press).

Clench (loc. cit.) mentioned the possibility that all Mexican specimens listed by Shields (loc. cit.) might represent *millerorum*. He was correct except, perhaps, for the specimen from Baja California Norte. Except for the latter, all of the above specimens have been seen by me and represent *millerorum*. The specimen from Baja California (for which Patterson & Powell, 1959, mention no unusual features) is well within the zoogeographical region characterized by the distribution of *spinetorum* (and the tendency of numerous populations of butterflies in southern California to have associations southward into northern Baja). A larval specimen of *Mitoura*, perhaps referable to *millerorum* and located in the Peabody Museum (Yale University), is of great interest. It is from "6 mi. E. of the Mexico-Michoacan boundary on

Hi. 45, leg. Hawksworth and Wiens" (Shields, loc. cit., and Peabody Museum). No adult was reared from this larva and, therefore, its specific identity as either of the Mexican taxa *millerorum* or *estela* cannot be ascertained with certainty. However, it was collected on *Arceuthobium globosum* Hawksworth and Wiens growing on *Pinus michoacana* Martinez (Pinaceae) and is identifiable as a *Mitoura*. If the specimen represents either of the taxa *millerorum* or *estela*, this apparent unique monophagy would be a character equivalent to that which, among others, distinguishes the specificity of *M. johnsoni* (considered monophagous on *A. douglassi* Engelm., Shields, loc. cit.; Johnson, 1976, and in press).

Conclusions

Four specimens are presently known of *M. millerorum*, three from Mexico and one from the United States. A larval specimen may represent the species and provides possible clues concerning its biology. The species distribution, relative to congeners and other related Eumaeini lycaenids, is characteristic of segregations occurring from montane central Mexico north to the isolated mountain ranges of southern Arizona and New Mexico (Johnson, in press; Rosen, 1975). This, along with its relative ease of identification, makes it a taxon which should be pursued by North American lepidopterists, particularly in regard to elucidation of its biology. As is well known, all of the hitherto mentioned species of *Mitoura* occur in highly local populations of low density (Brown, Eff & Rotger, 1957; Ferris & Brown, 1981). In the case of *millerorum*, however, its occurrence in the southwestern United States demonstrates that one should not assume that *spinetorum* will be the only species collectable by concerted fieldwork.

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